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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,846	02/21/2006	Adrian Boyle	37389-403800	4369
7590 Timothy J Keefer Seyfarth Shaw 55 E Monroe Street Chicago, IL 60603-5863		10/30/2007	EXAMINER AHMED, SHAMIM	
			ART UNIT 1792	PAPER NUMBER
			MAIL DATE 10/30/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/523,846	Applicant(s) BOYLE ET AL.	
	Examiner Shamim Ahmed	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7,9-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Arguments

1. As to the 102 (b) under Lim P. et al, the argument filed on 8/21/07 is not persuasive that Lim P. et al is dealing with gaseous halide environment not in liquid halide environment.
2. In response, examiner pointed out that the Lim P. et al's process is laser-assisted liquid film etching (see the title) and the applied liquid halide etchant is heated to form vapor and eventually condensed to a liquid form on the substrate (see first paragraph at page 3345).
3. As to the 103 (a), rejection, applicant's arguments filed 8/21/07 have been fully considered but they are not persuasive. Applicants argue that Russell et al teaching pattern etching and backside thinning of the silicon substrate but not disclosed the claimed invention.
4. In response to the argument, examiner states that the argument is not persuasive because Russell et al teach the use of laser beam with halocarbon environment but not in the liquid form but the secondary reference Ikegami et al teach the liquid environment is advantageous than the gaseous environment (see the rejection).

Therefore, it would have been obvious to one skilled in the art motivated to modify Russell et al's process with the teaching of Ikegami et al with reasonable expectation of successes.

5. Applicants also argue that none of the cited reference teaches the machining is performed through via structure or through a dice line.

In response, examiner states that the above limitation is in the preamble and the body of the claim does not depend on the preamble for completeness. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1,2,7,9-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Lim P. et al ("Laser-assisted liquid film etching").

Lim P. et al disclose an apparatus and a method of machining a silicon body with a green visible wavelength laser comprising:

- providing a liquid halide environment such as hydrofluoric acid at the location of the machining location on the silicon body by condensing a HFA vapor;
- directing the laser beam at the machining location to cause a chemical reaction between the silicon at the machining location with the laser beam;
- venting any gaseous by-products from the environment of the liquid halide compound and dispensing any solid-by-products in the liquid halide compound (see pages 3345-3346 and figures 1-2).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-7 and 9-14 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al (5,266,532) in view of Ikegami et al (6,720,522) and Lim P. et al.

Russell et al disclose a system and process using an ultraviolet (UV) laser assisted technique in a gaseous halocarbon silicon etching process, wherein a chemical reaction occurs between the silicon and the halocarbon such as CF₄ and producing gaseous and solid reaction products (col.4, lines 13-27).

Russell et al teach removal of reaction product is performed via pumping station (col.6, lines 20-32 and figure 2).

Russell et al fail to disclose that a liquid halide environment is established and directing the laser beam through the liquid environment, which locally heating the liquid compound in the vicinity of the machining location of the silicon substrate.

However, Ikegami et al (6,720,522) disclose a process and apparatus for laser beam machining, wherein the beam is directing to the silicon substrate through a liquid environment (col.3, lines 19-25).

Ikegami et al also disclose that in gaseous environment, the irradiated area of the silicon substrate having silicon grains scattered by laser beam machining and adhered to the machined surface, which causes reduced manufacturing yield (col.2, lines 6-9 and col.3, lines 8-17).

Ikegami et al further teach that the target surface is covered with the liquid in order to remove the heat and suppress the influence of vapor more efficiently that heat caused locally by the irradiation of the laser beam at the machining location (col.7, lines 1-5 and lines 35-45).

Ikegami et al teach that the system is equipped with a pump for removing the dust and particles produced in the machining process (col.7, lines 6-22), which teaching reads on the claimed limitation of venting the gaseous by-product from the liquid environment.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Ikegami et al's teaching into Russell et al's teaching for efficiently machining the silicon substrate with reduced contamination as taught by Ikegami et al.

Modified Russell et al with Ikegami et al may not explicitly teach that the liquid environment includes halide environment, whereas Ikegami et al teach that any kind of liquid can be used that is capable of absorb heat generated by the laser beam in and near the irradiation area or machining location as claimed (col.6, lines 51-55).

However, Lim P. et al teaches above in the paragraph 2, specifically halide liquid (hydrofluoric acid) environment is performed to efficiently etch silicon material (page 3345).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Lim P. et al's teaching into modified Russell et al's process for efficiently etching or machining as suggested by Lim P. et al.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Russell et al (5,266,532) in view of Ikegami et al (6,720,522) and Lim P. et al. and further in view of Yamazaki (JP-59225896).

Modified Russell et al discusses above in the paragraph 10 but fail to teach the apparatus include a liquid chamber environment comprises a refrigerated liquid.

However, Yamazaki illustrates a silicon machining process and apparatus including a liquid Freon compound environment in at least in the machining location (see the abstract).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to use refrigerated liquid such as liquid Freon for particle free etched feature as suggested by Yamazaki.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent 3,489,564 discloses a photolytic etching of silicon comprising substrate with halide liquid with laser beam irradiation.

13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

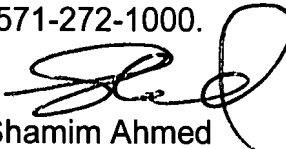
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on Tu-Fri (12:30-10:30) Every Monday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Shamim Ahmed
Primary Examiner
Art Unit 1792

SA
October 25, 2007